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# IRIS and 4S: Support and Plans

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# IRIS: International Reactor Innovative and Secure

# IRIS: Design and Main Features

- Advanced integral light water reactor
- 335 MWe/module
- Enhanced Safety-by-Design™
- GNEP near term grid appropriate reactor
- Design Certification testing program underway



# IRIS: Development Team

- 9 countries
- 18 organizations
  - 6 industry
  - 5 laboratories/  
government  
organizations
  - 6 universities
  - 1 power producer



# IRIS: Enhanced Safety

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Safety-by-design approach seeks to eliminate accidents rather than cope with their consequences. It has yielded:

- Simpler design
- Reduced number of safety systems (e.g., no HP ECCS)
- CDF of the order of  $10^{-8}/\text{yr}$

# IRIS: Type of Market

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- Smaller/developing countries or regions with limited grids/power needs
- Limited financial resources and capital at risk
- Cogeneration
- Several countries have already expressed interest

# IRIS: Status and Schedule

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- Preliminary NSSS design complete
- Pre-application licensing underway
- Complete DC testing – 2011
- Submit DC application – 1Q 2012
- Obtain FDA – 2014
- Available for commercial deployment in the 2015 – 2017 timeframe

# IRIS: Licensing Status

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- Completed as part of pre-application:
  - Design description
  - Preliminary safety analyses
  - Planned testing program
  - Integral testing scaling
  - Test facility design
  - Test matrix
- The Croatia Regulator has asked for MDEP.



# IRIS: Licensing Status (cont.)

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- Planned 2008 submittals:
  - Conformance with regulation (SRPs)
  - Revised plant description
  - Risk informed licensing
  - EPZ re-evaluation
  - QA plan
  - Complete scaling analyses
- DOE proposed FY09-FY13 budget will help Industry obtain DC for first US Grid Appropriate Reactor

# IRIS: NRC Support Needed

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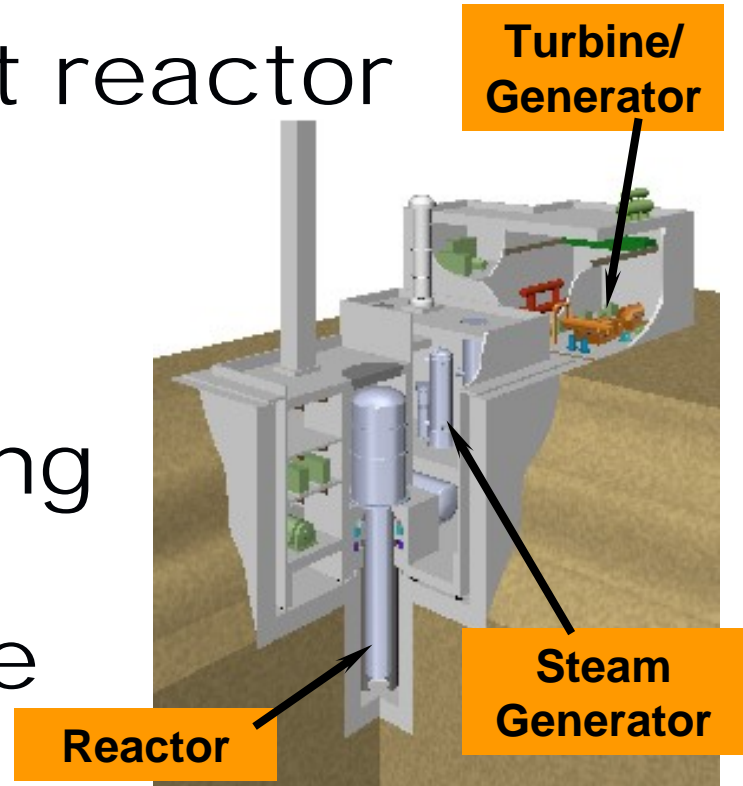
- Revitalize pre-application process
- Have periodic meetings following review of submittals  
(First scheduled for early April)
- MDEP: Finalize with Croatia and pursue with other interested countries
- Coordinate with DOE to provide sufficient resources for a timely IRIS FDA

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4S:  
Super-Safe, Small and Simple





# 4S: Design and Main Features

- Sodium cooled fast reactor
- 30 MWt (10MWe)
- Main features
  - Passive safety
  - No onsite refueling for 30 years
  - Low maintenance requirement
  - High inherent security



# 4S: Development Team

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- Design, Safety Analysis, R&D: Toshiba 
- Licensing: Westinghouse 
- Safety Analysis, Seismic Isolation, R&D: CRIEPI 
- Fuel: Argonne National Laboratory 

## 4S: Type of Market

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- Remote areas of small power demand (e.g., Galena, Alaska)
- Considered a candidate for GNEP grid-appropriate small and medium reactor design
- Further applications:
  - Natural resources development (oil sand/shale, mining), desalination, hydrogen production

# 4S: Status of Development and Licensing

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- Familiarization to the NRC staff started (first meeting Oct. 2007; next meeting Feb 21, 2008)
- Major sodium components developed
- Further verification testing will be identified through the pre-application review using PIRT
- Application for Final Design Approval (FDA) planned 2009

# 4S: Test Facility for Future Tests

- Toshiba Sodium Component Test Facility
- Completed in December 2007





# 4S: Proposed Licensing Approach

- FDA application in 2009
  - Phase 1: Design Familiarization
  - Phase 2: Submit technical reports
  - Phase 3: FDA application

2007	2008	2009	2010	2011	2012
	Pre-application review (Phase1)	(Phase2)	Final Design Approval (FDA) (Phase3)		
			Preparation of Combined License (COL)		COL

## 4S: Next Step / NRC Support

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- Continue pre-application review process
  - Familiarization with design and key issues
  - Review of Technical Reports
  - Supply additional information as needed
- Provide sufficient resources and support for FDA process

# Acronyms (in order of appearance)

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- MWe: Megawatt-electric
- GNEP: Global Nuclear Energy Partnership
- HP ECCS: High Pressure Emergency Core Cooling System
- CDF: Core Damage Frequency
- NSSS: Nuclear Steam Supply System
- DC: Design Certification

# Acronyms (in order of appearance)

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- FDA: Final Design Approval
- MDEP: Multinational Design Evaluation Program
- SRP: Standard Review Plan
- EPZ: Emergency Planning Zone
- QA: Quality Assurance
- MWt: Megawatt-thermal
- R&D: Research and Development

# Acronyms (in order of appearance)

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- CRIEPI: Central Research Institute of Electric Power Industry
- PIRT: Phenomena Importance Ranking Table
- COL: Combined Construction and Operating License